

or lost. The application of the name to the nearly glabrous-leaved plants from Oregon, Washington, Idaho, British Columbia and nearby areas seems to be sound. Our interpretation differs from that of Hopkins in that we limit var. *glabrata* to the large-flowered plants with diverging pedicels and somewhat saccate outer sepals from the northwestern United States and adjacent Canada. The nearly glabrous types from the Rocky Mountains and farther east do not differ enough from typical var. *pycnocarpa* to be set off from it.

In accounting for *A. pycnocarpa*, var. *reducta*, it may be pointed out that this is the fifth entity described in *Arabis* from North America based on specimens with sterile, semi-sterile or diseased siliques. Partial or complete sterility is a fairly common phenomenon in *Arabis* and has been repeatedly observed in the field in widely separated places. The distinctive characteristics claimed for var. *reducta* are attributable in a large part, particularly in the type specimen, to the diseased siliques, which have only a powdery brown mass in place of normal seeds. The name is considered to have been based on a monstrosity, hence it does not have valid priority over var. *pycnocarpa*.

(To be continued)

A STUDY OF ARENARIA PATULA

JULIAN A. STEYERMARK

ONE of the most characteristic spring-flowering species which carpets the limestone glades and barrens of the Missouri Ozarks is the little annual species of sandwort, *Arenaria patula* Michx. Its numerous dainty white blossoms appear in April and May, covering thousands of square miles of rocky surface, and so densely are the areas covered that they suggest natural rock gardens. By June the seed is ripened and the plant dies after this brief three-months' span of activity.

While collecting in the spring of 1939 in an area on Crowley's Ridge adjacent to the lowlands of southeastern Missouri, the writer found plants of this species growing in open sandy ground, a habitat quite unlike the rocky glades and outcrops in other portions of the state. Moreover, all the plants observed were of

a very luxuriant type with larger, broader leaves and taller, stouter stems with greatly elongated internodes, giving a different aspect from the usual slender-leaved and -stemmed phases of this species. Subsequent examination of the collection from this area, together with an investigation of the variation of the species as a whole, brought out the fact that the group passing under the name of *Arenaria patula* was in need of further study. The purpose of the present paper, therefore, is to delimit the variation found within this species.

In 1803 Michaux¹ described *Arenaria patula* from a plant collected "circa Knoxville" which was "tota puberula". Specimens collected by Dr. Short in Kentucky were later cited by Torrey and Gray² as representing Michaux's species; the reference by them to Professor Ruffner's collection from the mountains of Virginia was a mistaken determination and referred to another plant. Although Michaux described his plant as "puberula", actually there are no non-glandular hairs in any collections of the species. Torrey and Gray state in their description that the stems are "glandular-pubescent under a lens". On the same page of the Flora of North America, Torrey and Gray³ described another species, *A. Pitcheri*, taken from Nuttall's mss., collected by Nuttall from "plains of Arkansas". This species was noted at the time to differ from *A. patula* principally in its glabrous stems. In the Synoptical Flora of North America,⁴ however, Robinson reduced outright several species, including *Arenaria Pitcheri* Nutt., to synonymy under the earlier described *Arenaria patula* Michx. In passing, Robinson⁵ states only that "the leaves of this species are variable, more often narrowly linear or filiform, 4 to 7 lines in length, but occasionally 1½ inches long and a line wide." The more significant variation of glandularity versus glabritiy Robinson did not consider, viewing his species-concept of *A. patula* as a puberulent group together with *A. tenella* Nutt. of the northwestern United States as contrasted to the glabrous *A. stricta* Michx. and var. *texana* Rob. In this concept Robinson was followed by all subsequent authors, and the whole question of

¹ Michaux, A. Fl. Bor.-Am. 1: 273. 1803.

² Torrey, J. and A. Gray, Fl. N. Am. 1: 180. 1838.

³ Ibid.

⁴ Robinson in Gray, Syn. Fl. N. Am. 1: 245. 1895-97.

⁵ Ibid.

variation within the species seems to have been ignored, except for notes made from time to time by some collectors when exceptionally glandular specimens were encountered.

From a study of many specimens, it is evident that the variability of the species is more than might appear at a first glance. In addition to the glabry or glandularity, are found other differences, such as width of leaves, length of internodes, and length, ribbing, and glabry of the sepals. Mature seeds of a number of specimens were examined for critical characters, but no distinctive differences were encountered. The majority of the plants of *Arenaria patula* in the Missouri Ozarks and the limestone hills of Alabama are characterized by their almost complete glabry, typical of Nuttall's *Arenaria Pitcheri* from "plains of Arkansas". Especially in the northeastern area of dispersal of the species, the stems and pedicels show an abundance of glandularity, while to the south and especially in low sandy Tertiary soils are luxuriant robust types of plants with much broader leaves. While the extremes of these types of variation appear to be quite distinct, too many intergradations exist which break down between the groups. This, together with the occurrence of the variations mostly scattered throughout the entire area of distribution and without any real, definite geographical ranges, indicates that the variations are best regarded as forms rather than as varieties.

In the study of this species the author has had the privilege of the examination of material from the following herbaria: Herbarium of the Field Museum of Natural History (F), Gray Herbarium of Harvard University (G), Missouri Botanical Garden (M), the Academy of Natural Sciences of Philadelphia (P) and the University of Tennessee (T). To the curators of these herbaria the writer is deeply appreciative for their courtesy in loaning the material. To Mr. C. A. Weatherby the writer is greatly indebted for valuable suggestions.

- Leaves mostly 2–3.2 mm. broad, as much as 3.5–5.2 cm. long
 *A. patula* f. *robusta*.
 Leaves 0.5–1.5 mm. broad.
 Sepals wholly glabrous; stems, pedicels, and leaves mostly
 entirely glabrous..... *A. patula* f. *Pitcheri*.
 Sepals densely to lightly glandular; stems pedicels, or (and)
 leaves glabrous to glandular.

- Sepals, pedicels, leaves, and stems densely glandular *A. patula*.
 Sepals, and pedicels slightly to densely glandular; leaves
 and stems mostly glabrous *A. patula* f. *media*.

ARENARIA PATULA Michx. Fl. Bor. Am. 1: 273. 1803; Torr. & Gray, Fl. N. Am. 1: 180. 1838; Robinson in Gray, Syn. Fl. N. Am. 1¹: 245. 1895-97; Rob. & Fern. in Gray, Man. 7th ed. 380. 1908; Britton & Brown, Ill. Fl. ed. 2. 2: 56. 1913. *Alsine patula* Gray, Man. ed. 2. 58. 1856; Chapman, Fl. Southern U. S. 49. 1860. *Alsinopsis patula* (Michx.) Small, Fl. Se. U. S. ed. 2. 420. 1913. *Sabulina patula* (Michx.) Small, Man. Se. Flora. 499. 1933.

Stems 7-27 cm. tall, simple or branched from below and at the middle, slender, 0.5-0.9 mm. in diameter, the internodes not especially elongated, usually densely glandular with long-stalked glandular hairs up to 0.5-0.8 mm. long, the internodes 0.8-3.5 cm. long; leaves averaging short and slender, 0.8-2.5 cm. long, 0.8-1 mm. broad, sparsely to moderately glandular; inflorescence much branched, the pedicels filiform, sparsely to densely glandular, especially abundant at base of pedicel and at tip below the flower; sepals 4.5-6 mm. long, 0.8-1.5 mm. broad, 3-5-ribbed, the ribs usually conspicuous but separated, moderately to densely glandular, the inner sepals conspicuously scarious; petals 7-9 mm. long, 2.5-3 mm. exceeding the tips of the sepals.—Distributed in Ohio, Indiana, Illinois, Kentucky, Tennessee, and locally in eastern Oklahoma. This form is commonest in the northeastern part of the range of the species. It is the only form of the species found in Ohio and Indiana.—OHIO: Dayton, June 3, 1898, *Moseley* (F). INDIANA: Lafayette, May, 1877, *A. H. Young* (M); about 4 miles southwest of Lafayette, Tippecanoe Co., *Deam 51943* (F). KENTUCKY: vicinity of Mammoth Cave, Edmonson Co., May, 1899, *Dr. E. Palmer* (G). TENNESSEE: deep in moist woods loam, Paint Rock bluff of French Broad River, 1¼ mi. beyond Marbledale, Knox Co., April 19, 1938, *Jennison 97* (T). ILLINOIS: limestone ledges, South Chicago, July 12, 1875, *Hill* (G); Mound, Joliet, June 11, 1881, *Boyce* (F). OKLAHOMA: Limestone Gap, April 16, 1877, *Butler 3* (M), and 79 (F); 10 miles north of Limestone Gap, April 21, 1877, *Butler 11002* (F M.).

Most of the specimens cited above have more or less dense glandularity on the stems, leaves, pedicels, and sepals. *Jennison 97* from near the type locality in Knox County, Tennessee, is somewhat intermediate between typical *A. patula* and forma *media* since the leaves and sepals are only slightly glandular to glabrate, while the stems and pedicels are more or less densely glandular. *Deam 51943* from Indiana is glandular on all parts of

the plant and may be considered as the type of plant Michaux collected around Knoxville when he described his plant as "tota puberula". Of all the specimens I have examined from Tennessee in the vicinity of the type locality, there is none which is as densely glandular throughout as is *Deam 51943* and most of the other specimens cited above; the nearest approach in Tennessee to a densely glandular plant is the one collected by Jennison (no. 97) in Knox County.

A. PATULA forma **Pitcheri** (Nutt.), comb. nov. *A. Pitcheri* Nutt. ex Torr. & Gray, Fl. N. Am. 1: 180. 1838.—Plants usually of smaller stature and with shorter more slender leaves; stems 6–25 cm. tall, usually simple below, mostly slender and wiry, 0.2–1 mm. in diameter, the internodes usually short, those near the base of the stem the shortest, 0.5–4 cm. long, completely glabrous or practically so; main cauline leaves smallest at and near the base of the plant, 0.6–2.5 cm. long, 0.4–1 mm. broad, glabrous; inflorescence usually short and little-branched, the pedicels filiform, glabrous or rarely sparsely minutely glandular near base of pedicel or at tip below the flower; sepals usually 5-ribbed, usually conspicuously so with the ribs closer together than in the other forms, somewhat scarious, especially on the inner sepals, but less so than in any of the other forms, linear-lanceolate, acuminate with a longer more sharply pointed tip than in the other forms, 3.5–7 mm. long, 0.8–1.3 mm. broad, glabrous throughout; petals 6–9 mm. long, 2–3.5 mm. exceeding the tips of the sepals.—Kentucky, Tennessee, Alabama, Missouri, Arkansas, Kansas, Oklahoma, and Texas. Commonest on the limestone barrens of the Ozarks of Missouri and on the chalk barrens of Alabama.—KENTUCKY: "Torr. & Gray, Fl. N. Am., ex herb. *George Thurber*" (G); *Curtis* (M). TENNESSEE: *Laverne, Smith* (F); Nashville, April, 1878, *Gattinger* (F). ALABAMA: limestone hills, Huntsville, April 28, 1883, *Mohr* (G); Lawrence Co., 1866, *Peters* (G); gneiss outcrops near Coosa River between Mitchell Dam and Knight's Ferry, Chilton Co., May 7, 1937, *Harper 3575* (G); Chalk Barrens, about a mile west of Epes, Sumter Co., April 8, 1934, *Harper 3157* (G). MISSOURI: Greene Co., April 30, 1887, *Blankinship* (G); Washington Co., 1884, *Bebb* (G); Independence, May 21, 1894, *Bush 53* (G); Jefferson Co., May 28, 1887, *Eggert* (G); Greenwood, May 10, 1912, *Bush 6667* (G); Allenton, July 5, 1887, *Letterman* (F); Jefferson Co., April 23, 1887, *Hasse* (F); Potosi, Washington Co., June–July, *Pech* (F); Greenwood, Jackson Co., May 9, 1897, *Mackenzie* (F); Highway 66 east, Laclede Co., April 30, 1938, *Geo. Moore* (F); along tributary of South Creek of Gravel River, 3½ mi. east of Lisle, Cass Co., June 2, 1938, *Steyermark 5725* (F); border-

ing Sac River around Percy Cave, 5 mi. NW of Springfield, Greene Co., May 5, 1939, *Steyermark 22110* (F); along Wyatt Creek, sect. 3, 4 mi. east of Lanton, Howell Co., April 27, 1938, *Steyermark 5174* (F); sandstone glade along Sinking Creek, 2½ mi. SW of Everton, Dade Co., May 7, 1939, *Steyermark 22289* (F); 1 mi. northwest of Cabool, Texas Co., June 9, 1939, *Steyermark 26946* (F). ARKANSAS: Prescott, May, 1884, *Letterman*, in part (F); “**Arenaria Pitcheri*” “Arkansas” presented by Elias Durand, 1866, coll. *Nuttall* (G, TYPE collection of *Arenaria Pitcheri*). KANSAS: Chautauqua Co., May 7, 1897, *Hitchcock 1010* (G, M). OKLAHOMA: *Waugh 12* (M); Sapulpa, April 29, 1895, *Bush 901* (M); 1 mi. north of Limestone Gap, May 18, 1877, *Butler 64* (F). TEXAS: Lindale, April 23, 1901, *Reverchon* (M).

I have seen isotype collections of *Arenaria Pitcheri* Nutt. from Arkansas (specimens in Gray Herb. and Acad. of Nat. Sci. Phila.); these specimens are completely glabrous. Plants collected by Dr. Pitcher from “Arkansas” and cited by Torrey and Gray are also strictly glabrous and are conspecific with the Nuttall specimens. Most of these glabrous forms have been collected from Missouri and Alabama, whereas Arkansas has yielded fewer collections of this glabrous form in recent years than of *A. patula* f. *media*. The completely glabrous habit combined with conspicuously 5-ribbed acuminate narrow sepals in which the ribs are close together make this form stand out from the more glandular plants with often loosely and inconspicuously ribbed sepals of *A. patula* f. *media*. Yet, several specimens are found which are otherwise glabrous except for a small amount of glandularity on the pedicels, and these break down the distinction. Specimens which exhibit this transition are *Letterman* from Prescott, Arkansas (Field Mus. Herb.), and *Peters* from Lawrence Co., Alabama (Gray Herb.).

A. PATULA forma **robusta**, f. nov., a typo differt caulibus 12–42 cm. altis, glabris vel interdum glandulosis 0.8–1.5 mm. latis, internodiis elongatis 1.3–8.5 cm. longis; foliis caulinis 1.5–5.2 cm. longis, 1.5–3.2 mm. latis, glabris; pedicellis parce glandulosis vel fere glabris; sepalis plerumque 3-costatis scariosis subacutis glandulosis vel fere glabris, 3–4.5 mm. longis, 1–1.5 mm. latis. MISSOURI: open sandy ground in open woods along Gillis Bluff, sect. 8 and 17, 5 mi. southwest of Quilin, Butler Co., May 27, 1939, *J. A. Steyermark 26652* (TYPE, in Herb. Field Mus.).

Stems 12–42 cm. tall, remaining mostly simple below and up to the flowering portion, mostly glabrous or occasionally with

scattered glandularity, 0.8–1.5 mm. broad, the internodes usually greatly elongated, especially the middle and upper ones, 1.3–8.5 cm. long, those just below the first branch of the inflorescence usually 3–8.5 cm. long, mostly glabrous; main cauline leaves smallest at the base of the plant, increasing in length upwards, 1.5–5.2 cm. long, 1.5–3.2 mm. broad, glabrous; inflorescence moderately branched with elongated pedicels, the pedicels usually sparsely glandular or sometimes almost glabrous; sepals usually 3-ribbed, the ribs conspicuous but well separated, both inner and outer sepals scarious, tips of sepals slightly less acute at summit, usually sparsely to moderately glandular or almost smooth, 3–4.5 mm. long, 1–1.5 mm. broad; petals 7–9.5 mm. long, 3.5–6 mm. exceeding the tips of the sepals.—TENNESSEE: West Nashville, May 26–27, 1909, *Eggleston 4431* (G). MISSOURI: 5 miles southwest of Quilin, Butler Co., May 27, 1939, *Steyermark 26652* (TYPE in F, ISOTYPES in G and M). ARKANSAS: Grand Prairie, about a mile west of Screeton, Prairie Co., May 1, 1923, *Harper 28* (G); Prescott, May, 1884, *Letterman*, in part (G); near Hazen, Grand Prairie, May 22, 1924, *H. E. Wheeler 84* (F). KANSAS: Miami Co., May 26, 1883, *Oyster* (F). TEXAS: 2½ miles east of New Boston, Bowie Co., May 20, 1937, *Cory 22962* (G); Paris, April 10, 1904, *Reverchon 4285* (G, M); 1845, *Wright* (G).

This form is rather rare and occurs scattered throughout the southern portion of the range of the species. Some specimens of this form are not easily separated from the species. For example, *E. J. Palmer 5543* and *H. E. Wheeler 84* approach this form in size of plant, but have the narrower leaf-blades of typical *A. patula*. A specimen collected by Oyster from Miami Co., Kansas and *Harper 28* from Arkansas are transitional between this form and *A. patula* f. *media*.

A. PATULA forma **media**, f. nov., a typo differt caulibus plerumque glabris vel supra minute glandulosis; foliis 0.8–2.7 cm. longis, 0.5–1.5 mm. latis, glabris vel parce glandulosis; sepalis scariosis 3–7 mm. longis, 0.8–1.25 mm. latis, costis plerumque conspicuis confertis, glabris vel parce glandulosis.—TENNESSEE: rocky glades near Nashville, May, *Gattinger* (Type in Herb. Field Mus., isotypes at G, M).

Stems 10–30 cm. tall, simple below or branched from the middle, slender, 0.5–1 mm. in diameter, the internodes rather elongated, the lower usually glabrous, the middle and upper glabrous to minutely glandular, the internodes below the inflorescence 1.5–5 cm. long, those just below the first branch of the inflorescence usually 3–5.5 cm. long, the lower ones shorter, the glandularity confined mostly to the lower part of the inter-

nodes; main cauline leaves smallest at the base of the plant, increasing in length upwards, 0.8–2.7 cm. long, 0.5–1.5 mm. broad, glabrous to sparsely glandular; inflorescence usually much branched, the pedicels filiform, elongate, usually sparsely or moderately glandular especially at base of pedicel and near tip just below flower, or glabrous; sepals 3- to 5-ribbed, scarious, especially the inner ones, 3–7 mm. long, 0.8–1.25 mm. broad, the ribs conspicuous, close, and elevated, or inconspicuous, separated and depressed, glabrous to slightly glandular; petals 6.5–9 mm. long, 2.5–5 mm. exceeding the tips of the sepals.—Kentucky, Tennessee, Alabama, Illinois, Missouri, Arkansas, Oklahoma, and Texas. KENTUCKY: Summit of the calcareous cliffs of the Kentucky (River), *Griswold* (G); Henry Mt., Irvine, Estill Co., May 25, 1927, *W. A. Anderson 506* (G); cliffs of Kentucky River, 1835, *Short* (G), and 1840, *Short* (M); Lexington, May 19, 1882, herb. Wm. Dunham (F); Cliffs of Kentucky River, High Bridge, May 13, 1923, *Mc Farland 21* (M); Bowling Green, May, 1896, *Price* (M). TENNESSEE: near Nashville, May 12, 1903, *Ruth 391* (G); 5 mi. south of Murfreesboro, Rutherford Co., April 24, 1936, *Svenson 7761* (G, T); Lebanon, Wilson Co., May 23, 1934, *Harger 7916* (G); vicinity of Nashville, *Gattinger* (G); rocky glades near Nashville, May, *Gattinger* (F, G, M), and May, 1879, *Gattinger* (F, M); Nashville, May 14–17, 1894, *Bicknell* (F); dry woods, Loyston, Union Co., May 27, 1934, *Rice* (T); dry woods, Sequoia Hills, Knoxville, Knox Co., May 4, 1937, *W. B. Drew, S. V. Drew, and Hesler 412* (T); cedar barrens near Mascot, Knox Co., May 10, 1936, *J. K. Underwood* (T); cedar glades, along Nashville road near Lavergne, Davidson Co., June 2, 1938, *Svenson 8707* (T); open abandoned field, near Nashville, Davidson Co., April 20, 1940, *Shanks and Sharp 455* (T); rocky pasture, near Norris, Anderson Co., April 25, 1940, *Cole, Jr. 490* (T); on rocky limestone soil near Lebanon, Wilson Co., April 19, 1940, *Shanks and Sharp 449* (T); cedar barrens near Lavergne, Rutherford Co., April 20, 1940, *Shanks and Sharp 441* (T); rock quarry, Norris, Anderson Co., May 20, 1937, *Varnell* (T); near Lavergne, Rutherford Co., May 4, 1898, *Eggert* (M); *Wilkinson* (G, M). ALABAMA: Northern Alabama, June, 1865, *Dr. Stewart* (F); Winston Co., May 1, 1881, *Mohr* (F). ILLINOIS: Joliet, May 26, 1864, herb. Wm. Boott (G); barrens, Romeo, May 22, 1897, *Umbach* (F, M); Chicago, *Munroe* (F); 12 mi. from Chicago, June 15 and July 3, 1874, *H. H. Babcock* (G); Kankakee, 1914, *De Selm 791* (F). MISSOURI: Eagle Rock, June 10, 1897, *Bush 8* (G); upland sandstone glades, 2 mi. sw. of Birdsong, St. Clair Co., June 27, 1939, *Steyermark 27506* (F); St. Louis Co., May 15, 1879, *Letterman* (F); Allenton, May 26, 1886, *Eggert* (F); Allenton, April 30, 1880, *Letterman* (F); Cedar Hill, May 17, 1923, *Kellogg* (M); 1887,

Dr. Hasse (M); Noel, May 5, 1909, *Bush 5618a* (G); Crystal City, Engelm. herb. (M). ARKANSAS: Ulm, Prairie Co., May 9, 1937, *Demaree 14920* (M); Eureka Springs, April 17, 1899, *Trelease* (M); Eureka Springs, May 8, 1899, *Canby 11* (G); east of Mountain Home, Baxter Co., June 8, 1933, *Steyermark 7837* (M); Penters Bluff, Croker Springs, Izard Co., April 16, 1938, *Demaree 17007* (F); Eureka Springs, Carroll Co., May 17, 1914, *E. J. Palmer 5543* (F, M); northwestern slope of Fourche Mt. (Allis Mt.), Pulaski Co., April 26, 1923, *Harper 16* (G); moist prairie, Lonoke, April 25, herb. Warren H. Manning (G); low moist meadows, northwestern Ark., April, *Harvey* (F, G, M); damp meadows, May, 188—, *Harvey*—no. 20 of Harvey's Ark. flora (F). OKLAHOMA: 1 mi. north of Limestone Gap, May 18, 1877, *Butler* (F, M); Catoosa, May 8, 1895, *Bush 966* (M). TEXAS: *Drummond* (G); 32, Hooker misit, *Drummond*, 1835 (G); *Lindheimer*, 1844, 223. Fasc. II. (G, M); Hockley, 1890, *Thurrow* (F), as *Stellaria macropetala*.

This is the common and most widespread variation of *Arenaria patula*. Several specimens appear as intermediates between the more pronounced glandular typical *Arenaria patula* and the glabrous *A. patula* f. *Pitcheri*.

FIELD MUSEUM OF NATURAL HISTORY
Chicago

A NOTE ON THE AUTHORSHIP OF CERTAIN SPECIES OF CYPERACEAE

CHARLES GILLY

WHILE recently using Torrey's "Monograph of North American Cyperaceae" (Annals of the Lyceum of Natural History of New York 3: 239-443. 1836). I found that five species and two combinations published therein have been rather consistently accredited to the wrong author. In his introduction, Torrey wrote, "Most valuable aid has been afforded me, not only in the communication of specimens, but in every part of this work by my friend Dr. Gray. The revision of the Rhynchosporae is entirely his own; and the Synopsis of North American Carices, I wish to have considered as our joint performance." Again, preceding the genus *Rhynchospora* in the body of the "Monograph", he wrote, "The following revision of the North American species of *Rhynchospora* and *Ceratoschoenus* was prepared by Dr. Gray. His valuable Monograph contained in the present